

CLAIMS

What is claimed is:

- 1 1. A method of determining a resistivity parameter of interest of an anisotropic earth
2 formation , the method comprising:
3 (a) obtaining a plurality of unfocused differential array resistivity
4 measurement (lateral log) over a depth interval;
5 (b) obtaining a plurality of induction resistivity measurements with an
6 induction logging tool over said depth interval;
7 (c) processing said plurality of unfocused differential array resistivity
8 measurements and said plurality of induction resistivity measurements and
9 obtaining therefrom said parameter of interest, said processing excluding
10 an inversion of said induction log
11
1 2. The method of claim 1 wherein said parameter of interest comprises a mean
2 resistivity of said earth formation.
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1 3. The method of claim 1 wherein said parameter of interest comprises a vertical
2 resistivity of said earth formation.
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1 4. The method of claim 1 wherein said parameter of interest comprises a horizontal
2 resistivity of said earth formation.
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- 1 5. The method of claim 1 wherein said plurality of induction measurements
2 comprises focused measurements.
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- 1 6. The method of claim 1 wherein said processing further comprises applying a
2 borehole correction and an invasion correction to said lateral log
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- 1 7. The method of claim 1 wherein said processing further comprises applying a
2 borehole correction and an invasion correction to said induction log and obtaining
3 a horizontal resistivity.
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- 1 8. The method of claim 7 further comprising determining an anisotropy factor from
2 a mean resistivity and a horizontal resistivity.
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- 1 9. The method of claim 1 further comprising making measurements with a micro-
2 laterolog and using said micro-laterolog measurements in said processing.
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- 1 10. An apparatus for use in a borehole in an anisotropic earth formation for
2 determining a resistivity parameter of said earth formation, the apparatus
3 comprising:
4 (a) an unfocused differential array resistivity measuring device for obtaining a
5 a plurality of unfocused differential resistivity measurements (lateral log)
6 over a depth interval;

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- 7 (b) an induction resistivity measuring device for obtaining a plurality of
8 induction resistivity measurements over said depth interval;
- 9 (c) a processor for processing said plurality of unfocused differential array
10 resistivity measurements and said plurality of induction resistivity
11 measurements and obtaining therefrom obtaining said parameter of
12 interest, said processing excluding an inversion of said induction log.

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1 11. The apparatus of claim 10 wherein said parameter of interest comprises a vertical
2 resistivity of said earth formation.

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1 12. The apparatus of claim 10 wherein said parameter of interest comprises a
2 horizontal resistivity of said earth formation.

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1 13. The apparatus of claim 10 wherein said plurality of induction measurements
2 comprises focused measurements.

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1 14. The apparatus of claim 10 wherein said processor further applies a borehole
2 correction and an invasion correction to said lateral log.

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1 15. The apparatus of claim 14 wherein said processor further comprises applies a
2 borehole correction and an invasion correction to said induction log and obtains
3 a horizontal resistivity.

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1 16. The apparatus of claim 15 wherein said processor further determines an
2 anisotropy factor from a mean resistivity and said horizontal resistivity.

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1 17. The apparatus of claim 10 further comprising making measurements with a
2 micro- laterolog and using said micro-laterolog measurements in said processing.

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1 18. The apparatus of claim 10 wherein said processor performs said processing
2 substantially in real time

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1 19. The apparatus of claim 10 wherein said processor is at a surface location.

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1 20 The apparatus of claim 10 wherein said processor is at a downhole location.

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1 21. The apparatus of claim 10 wherein said induction resistivity device is an array
2 device.

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1 22. The apparatus of claim 10 wherein said induction resistivity device comprises a
2 plurality of coils with an axis substantially parallel to an axis of said resistivity
3 device.

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1 23. A system for use in a borehole in an anisotropic earth formation for determining a
2 resistivity parameter of said earth formation, the system comprising:
3 (a) an unfocused differential array resistivity measuring device for obtaining a
4 a plurality of unfocused differential resistivity measurements (lateral log)
5 over a depth interval;
6 (b) an induction resistivity measuring device for obtaining a plurality of
7 induction resistivity measurements over said depth interval;
8 (c) a processor for processing said plurality of unfocused differential array
9 resistivity measurements and said plurality of induction resistivity
10 measurements and obtaining therefrom obtaining said parameter of
11 interest, said processing excluding an inversion of said induction log; and
12 (d) conveyance device for conveying said unfocused differential array
13 resistivity measuring device and said induction resistivity device into said
14 borehole.

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1 24. The system of claim 23 wherein said conveyance device comprises a wireline.

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1 25. The system of claim 23 wherein said conveyance device comprises coiled tubing.

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1 26. The system of claim 23 wherein said conveyance device comprises a drilling
2 tubular.

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- 1 27. The system of claim 23 wherein said processor is at a surface location.
2
- 1 28. The system of claim 23 wherein said processor is at a downhole location.
2
- 1 29. The system of claim 23 wherein said induction device comprises coils with axes
2 substantially parallel to an axis of the borehole.